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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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12/12/2005

Masumi Kubo

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EXAMINER

CHIEN, LUCY P

ART UNIT

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/560,340	<b>Applicant(s)</b> KUBO ET AL.	
	<b>Examiner</b> LUCY P. CHIEN	<b>Art Unit</b> 2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 07 October 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) 13 and 14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 and 15-33 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12/12/2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

***Claim Objections***

Claim 13 and 14 are objected to because of the following informalities: After the claim number, the claims should be labeled that they are withdrawn in parenthesis. Appropriate correction is required.

***Response to Arguments***

Applicant's arguments, see page 1, filed 10/7/2009, with respect to the rejection(s) of claim(s) 1-5,11,12,15-31 under Kubo (US 20030107695) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Lee et al (US 7154569).

***Claim Rejections - 35 USC § 102***

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

**Claim 1,2,9,10,15-17,29,30,32,33** are rejected under 35 U.S.C. 102(e) as being anticipated by Lee et al (US 7154569).

**Regarding Claim 1,9,10,29,32,33**

Lee et al discloses (Fig. 3C,5A, 5B) a first substrate (110), a second substrate (100), and a liquid crystal layer (3) provided between the first substrate and the second substrate; the liquid crystal display device having a plurality of picture element regions (190); wherein: the first substrate (110) includes a picture element electrode (190)

Art Unit: 2871

provided on the side of the liquid crystal layer, the picture element electrode being provided in each of the plurality of picture element regions, and a switching device (173a, 175a form a TFT) electrically connected to the picture element electrode (190); the second substrate includes a counter electrode (170) opposing the picture element electrode with the liquid crystal layer interposed there between; and in each of the plurality of picture element regions, the picture element electrode includes a solid area (190) including a plurality of unit solid areas; and the liquid crystal layer is in a vertical alignment (column 5, rows 50-55) when no voltage is applied between the picture element electrode and the counter electrode, and when a voltage is applied between the picture element electrode and the counter electrode, forms a liquid crystal domain taking a radially-inclined orientation in a region corresponding to each of the plurality of unit solid areas by an oblique electric field produced in the vicinity of each of the plurality of unit solid areas of the picture element electrode; the liquid crystal display device further comprising, in each of the plurality of picture element regions, a storage capacitance (133c) connected electrically in parallel to a liquid crystal capacitance which includes the picture element electrode, the counter electrode, and the liquid crystal layer; wherein in each of the plurality of picture element regions, the first substrate has an area where no solid area (192) of the picture element electrode is provided; and at least a part of the storage capacitance (133c) is located in the area of the first substrate where no solid area (192) is provided. A storage capacitor line extends in a direction such that a central elongated portion corresponding to a central portion of at least part of the storage capacitor line is aligned in the area where no solid

Art Unit: 2871

area is provided. The central elongated portion of the storage capacitor line is not aligned to overlap with any significant parts of the unit solid portions areas (190); the first substrate further includes a second insulating layer (180) for covering at least the thin film transistor and the storage electrode (133c); and the picture element electrode (190) is provided on the second insulating layer (180)

Regarding Claim 2,30,

Lee et al discloses (Fig. 3C, 5A, 5B) switching device is a thin film transistor (173a,175a form a tft)

Regarding Claim 15,

Lee et al discloses (Fig. 3C, 5A, 5B) wherein the plurality of unit solid areas have substantially the same shape and substantially the same size as one another, and form at least one unit lattice arranged to have rotational symmetry.

Regarding Claim 16,

Lee et al discloses (Fig. 3C, 5A, 5B) wherein the picture element electrode further has at least one opening, and the liquid crystal layer forms a liquid crystal domain taking a radially-inclined orientation in a region corresponding to the at least one opening by the oblique electric field when a voltage is applied between the picture element electrode and the counter electrode.

Regarding Claim 17,

Art Unit: 2871

Lee et al discloses (Fig. 3C, 5A, 5B) wherein the at least one opening includes a plurality of openings having substantially the same shape and substantially the same size as one another, and at least a part of the plurality of openings forms at least one unit lattice arrange to have rotational symmetry.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claim 3-5,31** are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (US 7154569) in view of Kim et al (US 6707511).

#### **Regarding Claim 3,31,**

Lee et al discloses everything as disclosed above.

Lee et al does not disclose, a storage electrode opposing the storage capacitance line and electrically connected to a drain electrode of the thin film transistor, and a first insulating layer (not shown, but exists in this invention to complete a storage capacitor) provided between the storage capacitance line and the storage electrode.

Kim et al discloses (Fig. 3b)(Column 4, rows 50-56) a storage electrode opposing the storage capacitance line and electrically connected to a drain electrode of the thin film transistor to prevent the reduction of the optical efficiency. A first insulating layer (303) provided between the storage capacitance line (305c, 305b) and the storage electrode (302c).

It would have been obvious to one of ordinary skill in the art to modify Lee et al to include Kim et al's storage capacitor to electrically connect to the drain electrode motivated by the desire to prevent the reduction of the optical efficiency (Column 4, rows 50-56).

Regarding Claim 4.,

In addition to Lee et al and Kim et al as disclosed above, Lee et al discloses (Fig. 3C, 5A, 5B) wherein at least a part of the storage capacitance line, at least a part of the storage electrode, and at least a part of the first insulating layer are located in the area.

Regarding Claim 5.

In addition to Lee et al and Kim et al as disclosed above, Lee et al discloses (Fig. 3C, 5A, 5B) wherein the first substrate includes a scanning line (121) electrically connected to a gate electrode (124a,124b) of the thin film transistor and a signal line (171) electrically connected to a source electrode (173a,173b) of the thin film transistor.

**Claim 11,12,18-20**, are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (US 7154569) in view of Suzuki (US 20020080320)

Regarding Claim 11,12,18.19

Lee et al discloses everything as disclosed above.

Lee et al does not disclose wherein the plurality of unit solid areas each have a shape having rotational symmetry and circular shape.

Suzuki [0061] discloses wherein the plurality of unit solid areas (pixel electrodes) each have a shape having rotational symmetry and circular shape having circular shape openings to improve the viewing angle dependence in all azimuthal angles [0061]

It would have been obvious to one of ordinary skill in the art to modify Lee et al to include Suzuki's circular shaped unit solid area motivated by the desire produce multiple domains while maintaining the symmetrical formation of the molecules because the pixel electrode has symmetrical shape as shown in Fig. 2C [0068].

Regarding Claim 20.

In addition to Lee et al and Kubo et al as disclosed above, Suzuki [0061] (Fig. 3D) discloses wherein in each of the plurality of picture element regions, a sum of area sizes of the plurality-of openings (119) of the picture element electrode is smaller than an area size of the solid area of the picture element electrode.

**Claim 21** are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (US 7154569) in view of Liao et al (US 6665041)



Regarding Claim 21,

Lee et al discloses everything as disclosed above.

Lee et al does not disclose a protrusion provided in each of the plurality of openings (14a) of the picture element electrode, wherein the protrusion has the same cross-sectional shape as that of the plurality of openings in a planar direction, and a side surface of the protrusion exerts an orientation-regulating force acting upon the liquid crystal molecules in the liquid crystal layer in the same direction as an orientation-regulating direction provided by the oblique electric field.

Liao et al discloses (Fig. 10A, 10B) a protrusion (1015) provided in each of the plurality of openings of the picture element electrode (1003), wherein the protrusion has the same cross-sectional shape as that of the plurality of openings in a planar direction, and a side surface of the protrusion exerts an orientation-regulating force acting upon the liquid crystal molecules in the liquid crystal layer in the same direction as an orientation-regulating direction provided by the oblique electric field.

It would have been obvious to one of ordinary skill in the art to modify Lee et al to include Liao et al's protrusion provided in each of the plurality of openings of the picture element electrode motivated by the desire to regulate the inclination of the liquid crystal molecules and reduces the effect of transverse electric field (column 29-39)

**Claim 22,23-26,28** are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (US 7154569) in view of Song et al (US 6710837)

Regarding Claim 22,

Lee et al discloses everything as disclosed above.

Lee et al does not disclose) wherein the second substrate has an orientation-regulating structure in an area corresponding to each of the plurality of unit solid areas, the orientation-regulating structure exerting an orientation-regulating force for placing the liquid crystal molecules in the liquid crystal layer into a radially-inclined orientation at least in a state where a voltage is applied between the picture element electrode and the counter electrode.

Song et al discloses (Fig. 6) wherein the second substrate has an orientation-regulating structure (17) in an area corresponding to each of the plurality of unit solid areas, the orientation-regulating structure exerting an orientation-regulating force for placing the liquid crystal molecules in the liquid crystal layer into a radially-inclined orientation at least in a state where a voltage is applied between the picture element electrode and the counter electrode.

It would have been obvious to one of ordinary skill in the art to modify Lee et al to include Song et al's protrusion on the unit solid area motivated by the desire to improve contrast ratio by forming a multi domain alignment liquid crystal display. (column 1, rows 49-60).

Regarding Claim 23,

In addition to Lee et al and Song et al as disclosed above, Song et al discloses (Fig. 6) wherein the orientation-regulating structure (27,17) is provided in an area corresponding to a vicinity/center portion of each of the plurality of unit solid areas.

Regarding Claim 24.

In addition to Lee et al and Song et al as disclosed above, Song et al discloses (Fig. 6) wherein in the liquid crystal domain formed in correspondence with each of the plurality of unit solid areas, the orientation-regulating direction provided by the orientation-regulating structure is in conformity with the direction of the radially-inclined orientation provided by the oblique electric field.

Regarding Claim 25.

In addition to Lee et al and Song et al as disclosed above, Song et al discloses (Fig. 6) wherein the orientation-regulating structure exerts an orientation-regulating force even in a state where no voltage is applied between the picture element electrode and the counter electrode.

Regarding Claim 26.

In addition to Lee et al and Song et al as disclosed above, Song et al discloses (Fig. 6) wherein the orientation-regulating structure is a protrusion included in the counter substrate (15) and protruding toward the liquid crystal layer.

Regarding Claim 28.

In addition to Lee et al and Song et al as disclosed above, Song et al discloses (Fig. 13 )wherein the liquid crystal domain takes a spiral radially-inclined orientation.

**Claim 27** is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (US 7154569) and of Song et al (US 6710837) in view of Kuo (US 6424397)

Regarding Claim 27,

Lee et al and Song et al disclose everything as disclosed above.

Lee et al and Song et al does not disclose) wherein a part of the storage capacitance overlaps the orientation-regulating structure.

Kuo discloses (Fig. 4E)(column 6, rows 4-11) wherein a part of the storage capacitance (408) overlaps the orientation-regulating structure (414).

It would have been obvious to one of ordinary skill in the art to modify Lee et al to and Song et al to include Kuo's storage capacitance overlapping the orientation regulating structure motivated by the desire to reduce production step by not using an outside photomask to form the protrusion element, therefore production cost is lowered and product yield is increased (column 8, rows 60-67).

***Claim Rejections - 35 USC § 103***

Art Unit: 2871

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claim 6,7** are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (US 7154569) in view of Shimada et al (US 5852485)

Regarding Claim 6,7.

Lee et al discloses everything as disclosed above.

Lee et al does not disclose the line branch and the electrode branch are branched so as to overlap a central portion of one of the plurality of unit solid areas or the vicinity thereof. The storage capacitance line includes at least one line stem extending generally parallel to the scanning line and a line branch branched from the at least one line stem; and the storage electrode includes at least one electrode stem opposing the at least one line stem with the first insulating layer interposed therebetween and an electrode branch branched from the at least one electrode stem.

Shimada et al discloses (Fig. 1A) the line branch and the electrode branch (16) are branched so as to overlap a central portion of one of the plurality of unit solid areas or the vicinity thereof. The storage capacitance line (125a) at least one electrode stem opposing the at least one line stem with the first insulating layer (115) interposed there

Art Unit: 2871

between and an electrode branch (16) branched from the at least one electrode stem (125a).

It would have been obvious to one of ordinary skill in the art to modify Lee et al to include Shimada et al's electrode branch to overlap the central portion of the unit solid area motivated by the desire to provide a signal provided from the data line to the pixel electrode (12).

**Claim 8** is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (US 7154569) and of Shimada et al (US 5852485) in view of Hayashi (US 6115089).

Regarding Claim 8,

Lee et al and Shimada et al disclose everything as disclosed above.

Lee et al and Shimada et al do not disclose wherein the at least one line stem is a plurality of line stems and the at least one electrode stem is a plurality of electrode stems.

Hayashi discloses wherein the at least one line stem is a plurality of line stems (one on the left and one on the right of the pixel electrode (151)), and the at least one electrode stem is a plurality of electrode stems.

It would have been obvious to one of ordinary skill in the art to modify Lee et al to include Hayashi's branched storage capacitor motivated by the desire to shield electric flux lines between the signal line (103) and transparent pixel electrode (151)(column 7, rows 37-42).

**Conclusion**

Art Unit: 2871

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LUCY P. CHIEN whose telephone number is (571)272-8579. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571)272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Examiner  
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